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TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.
END000006US1

In Re Application Of: **Farquhar et al.**

Serial No.
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2/28/00

Examiner
G. Winter

Group Art Unit
1746

Invention: **ACCELERATED ETCHING OF CHROMIUM**



TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.: 09/514,526

Applicant(s): Farquhar *et al.*

Filed: 02/28/00

Art Unit: 1746

Dkt. No.: END000006US1

Examiner: G. Winter

Title: **Accelerated Etching of Chromium**

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF OF APPELLANT

This Appeal Brief, pursuant to the Notice of Appeal filed March 30, 2004, is an appeal from the rejection of the Examiner dated December 30, 2003.

REAL PARTY IN INTEREST

International Business Machines, Inc. is the real party in interest.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 19-22 and 26-42 are currently pending.

Claims 26, 31, and 41 have been rejected under 35 U.S.C. §112, second paragraph, as

allegedly “being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.”

Claim 41 has been rejected under 35 U.S.C. §112, second paragraph, as allegedly “being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.”

Claims 26, 27, 19-22, 28, 29, 31-36, and 38-42 have been rejected under 35 U.S.C. §103(a) over Wei (United States Patent No. 4,350,564) and Geshner (United States Patent No. 4,105,468).

Claims 30 and 37 have been rejected under 35 U.S.C. §103(a) over Wei (United States Patent No. 4,350,564) and Geshner (United States Patent No. 4,105,468) and Blonder (United States Patent No. 5,149,404).

Claims 20, 21, 26, 29, 34, 36, 38-40 and 42 were objected to. However, the Examiner withdrew the objections to claims 20, 21, 26, 29, 34, 36, 38-40 and 42 in a telephone interview with Appellants’ representative (Jack P. Friedman) on May 24, 2004, which was confirmed in an Interview Summary of said telephone interview and in an Advisory Action issued on May 28, 2004.

This Brief is in support of an appeal from the aforementioned rejection of claims 19-22 and 26-42.

STATUS OF AMENDMENTS

There are no After-Final Amendments which have not been entered.

SUMMARY OF INVENTION

The present invention discloses an electrical structure, comprising: a chromium volume, wherein the chromium volume includes a layer of chromium; an iron-comprising body; an acid solution; and a layer of conductive metal on the layer of chromium, wherein the conductive metal includes an opening extending through its thickness, wherein a portion of the iron-comprising body is within the opening, wherein the portion of the iron-comprising body is in electrical contact with the chromium volume, and wherein a portion of the acid solution is within the opening, and wherein the portion of the acid solution is in contact with both the portion of the iron-comprising body and the chromium volume. See FIG. 3; specification, page 11, line 17 - page 12, line 4.

The present invention discloses an electrical structure, comprising: a chromium volume; an iron-comprising body in electrical contact with the chromium volume; an acid solution in contact with both the chromium volume and the iron-comprising body, wherein the acid solution is adapted to etch metallic chromium at a first etch rate in an absence of any present or prior contact between the metallic chromium and a body that includes iron. See FIG. 1; specification, page 4, line 18 - page 6, line 11. The acid solution is adapted to etch the chromium volume at a second etch rate that exceeds the first etch rate. See Table 1 on page 7; specification, page 7, lines 14-21.

The present invention discloses an electrical structure, comprising: a chromium volume; an iron-comprising body in electrical contact with the chromium volume; an acid solution in contact with both the chromium volume and the iron-comprising body; and a layer of conductive metal, wherein the chromium volume includes a layer of chromium, and wherein the layer of

chromium is on the layer of conductive metal and in direct mechanical contact with the layer of conductive metal. See FIG. 2; specification, page 10, line 23 - page 11, line 4.

The electrical structure may further comprises a chromium oxide layer on the chromium volume. See specification, page 5, lines 9-10.

The acid solution may include hydrochloric acid. See specification, page 5, lines 13-15. A temperature (T) and a molarity (M) of the hydrochloric acid is within a triangular space defined by (T,M) points of (21 °C, 2.4 M), (52 °C, 2.4 M), and (52 °C, 1.2 M). See FIG. 4; specification, page 8, line 17 - page 9, line 1.

The acid solution may be in a spray form or in a liquid bath form. See specification, page 5, lines 2-9.

The iron-comprising body may include steel. See specification, page 5, line 12.

The layer of conductive metal may include a metal selected from the group consisting of copper, aluminum, nickel, silver, and gold. See specification, page 10, line 23 - page 11, line 2.

The chromium volume may include metallic chromium. See specification, page 5, lines 9-16.

The electrical structure may further comprise a fluoropolymer dielectric volume bonded to the chromium volume. See specification, page 12, lines 6-13.

The acid solution may not be in contact with the layer of conductive metal. See specification, page 11, lines 2-4.

ISSUES

1. Whether claims 26, 31, and 41 are unpatentable under 35 U.S.C. §112, second paragraph, as allegedly “being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.”
2. Whether claim 41 is unpatentable under 35 U.S.C. §112, second paragraph, as allegedly “being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.”
3. Whether claims 26, 27, 19-22, 28, 29, 31-36, and 38-42 are unpatentable under 35 U.S.C. §103(a) over Wei (United States Patent No. 4,350,564) and Geshner (United States Patent No. 4,105,468).
4. The Examiner rejected claims 30 and 37 are unpatentable under 35 U.S.C. §103(a) over Wei (United States Patent No. 4,350,564) and Geshner (United States Patent No. 4,105,468) and Blonder (United States Patent No. 5,149,404).

GROUPING OF CLAIMS

With respect to the rejection of claims 26, 31, and 41 under 35 U.S.C. §112, second paragraph, as allegedly “being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, ” claims 26, 31, and 41 stand or fall together.

With respect to the rejection of claim 41 under 35 U.S.C. §112, second paragraph, as allegedly “being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections” claim 41 stands or falls by itself.

With respect to the rejection of claims 19-22 and 26-42 under 35 U.S.C. §113(a), the claims are grouped as shown in Table 1:

Table 1

Group	Claims	Do Claims of Group Rise or Fall Together?
1	20-21, 26-27, 31, 33, 35, 41	Yes
2	19, 32	Yes
3	22, 32	Yes
4	34, 42	Yes
5	38, 40	Yes
6	29, 36	Yes
7	39	Yes
8	30, 37	Yes

The claims of Group 2 do not stand and fall together with the claims of Group 1, because the claims of Group 2 each include the following issue not present in any of the claims of Group 1: whether Wei and Geshner teach or suggest the following feature: “wherein the electrical structure further comprises a chromium oxide layer on the chromium volume”.

The claims of Group 3 do not stand and fall together with the claims of Groups 1-2, because the claims of Group 3 each include the following issue not present in any of the claims of Groups 1-2: whether Wei and Geshner teach or suggest the following feature: “wherein said iron-comprising body includes steel”.

The claims of Group 4 do not stand and fall together with the claims of Groups 1-3, because the claims of Group 4 each include the following issue not present in any of the claims of Groups 1-3: whether Wei and Geshner teach or suggest the following feature: “wherein the acid solution is not in contact with the layer of conductive metal”.

The claims of Group 5 do not stand and fall together with the claims of Groups 1-4, because the claims of Group 5 each include the following issue not present in any of the claims of Groups 1-4: whether Wei and Geshner teach or suggest the following feature: “wherein the acid solution is adapted to etch the chromium volume at a second etch rate that exceeds the first etch rate”.

The claims of Group 6 do not stand and fall together with the claims of Groups 1-5, because the claims of Group 6 each include the following issue not present in any of the claims of Groups 1-5: whether Wei and Geshner teach or suggest the following feature: “wherein the chromium volume includes the metallic chromium, wherein the acid solution includes hydrochloric acid, wherein a temperature (T) and a molarity (M) of the hydrochloric acid is

within a triangular space defined by (T,M) points of (21 °C, 2.4 M), (52 °C, 2.4 M), and (52 °C, 1.2 M)”.

The claims of Group 7 do not stand and fall together with the claims of Groups 1-6, because the claims of Group 7 each include the following issue not present in any of the claims of Groups 1-5: whether Wei and Geshner teach or suggest the following feature: “wherein the acid solution is adapted to etch metallic chromium at a first etch rate in an absence of any present or prior contact between the metallic chromium and a body that includes iron”.

The claims of Group 8 do not stand and fall together with the claims of Groups 1-7, because the claims of Group 8 each include the following issue not present in any of the claims of Groups 1-5: whether Wei and Geshner and Blonder teach or suggest the following feature: “a fluoropolymer dielectric volume bonded to said chromium volume”.

ARGUMENT

Issue 1

CLAIMS 26, 31, AND 41 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §112, SECOND PARAGRAPH, AS ALLEGEDLY “being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.”

The Examiner rejected claims 26, 31, and 41 under 35 U.S.C. §112, second paragraph, as allegedly “being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, it is unclear what is being claimed when referencing an “electrical structure” More specifically, the claims disclose “an electrical structure” wherein an “acid solution is in contact with both the iron comprising body and the chromium volume within the opening.””

In response to the preceding rejection of claim 26 under 35 U.S.C. §112, second paragraph, Appellants respectfully note that in claim 26 the acid solution is an element of the electrical structure. Also in claim 26, the limitation “wherein the portion of the acid solution is in contact with both the portion of the iron-comprising body and the chromium volume” is a limitation that requires the acid solution to be in contact with both the portion of the iron-comprising body and the chromium volume. Thus, Appellants respectfully maintain that what is being claimed in claim 26 is clear. Accordingly, Appellants respectfully request reversal of the preceding rejection of claim 26 under 35 U.S.C. §112, second paragraph.

In response to the preceding rejection of claim 31 under 35 U.S.C. §112, second paragraph, Appellants respectfully note that in claim 31 the acid solution is an element of the electrical structure. Also in claim 31, the limitation of “an acid solution in contact with both the chromium volume and the iron-comprising body” is a limitation that requires the acid solution to

be in contact with both the chromium volume and the iron-comprising body. Thus, Appellants respectfully maintain that what is being claimed in claim 31 is clear. Accordingly, Appellants respectfully request reversal of the preceding rejection of claim 31 under 35 U.S.C. §112, second paragraph.

In response to the preceding rejection of claim 41 under 35 U.S.C. §112, second paragraph, Appellants respectfully note that in claim 41 the acid solution is an element of the electrical structure. Also in claim 41, the limitation of “an acid solution in contact with both the chromium volume and the iron-comprising body” is a limitation that requires the acid solution to be in contact with both the chromium volume and the iron-comprising body. Thus, Appellants respectfully maintain that what is being claimed in claim 41 is clear. Accordingly, Appellants respectfully request reversal of the preceding rejection of claim 41 under 35 U.S.C. §112, second paragraph.

A key aspect of the rejection of claims 26, 31, and 41 under 35 U.S.C. §112, second paragraph appears to be reflected in the Examiner’s “Response to Arguments” in which the Examiner alleges: “With respect to the pending 35 U.S.C. § 112 rejection applicant argued that applicant had amended claim to so as to claim the acid solution as a structural element and not a method step. The argument is not persuasive. The acid is not part of the structure. The acid reacts with the metal and is consumed. The acid will not be accorded status as structure in this application.”

In response, Appellants next present several arguments as to why the Examiner’s allegation that the acid solution is not part of the electrical structure in claims 26, 31, and 41,

because “[t]he acid reacts with the metal and is consumed” is not persuasive.

A first reason as to why the Examiner’s argument is not persuasive is that claims 26, 31, and 41 are drawn solely to structure and do not have any process limitations. While the specification discloses that the acid solution may etch the chromium volume, no process limitation relating to etching is being claimed and only the structural relationships among the acid solution, chromium volume, iron-comprising body, etc. are being claimed in claims 26, 31, and 41.

A second reason as to why the Examiner’s argument is not persuasive is that the Examiner’s argument is factually inconsistent inasmuch as the chromium volume is being consumed by the acid solution. Yet, the Examiner did not argue that the chromium body is not part of the claimed electrical structure even though the chromium volume is being consumed.. Thus, the Examiner’s argument is inconsistent with the factual aspects of the claims under consideration, and the Examiner’s argument which apparently distinguishes between the acid solution and chromium volume under 35 U.S.C. §112, second paragraph (with respect to being consumed) is confusing.

A third reason as to why the Examiner’s argument is not persuasive is that the Examiner’s argument that the acid cannot be a structural element because it is being consumed does not fall within any subject matter that is generally accepted under the patent laws as being non-patentable (e.g., laws of nature, abstract ideas, mental steps, etc.)

A fourth reason as to why the Examiner’s argument is not persuasive is that the Examiner has not cited any case law or other legal authority to support the Examiner’s contention that the acid cannot be a structural element because it is being consumed. The Examiner has not cited

any case which has invalidated the patentability of a claimed structural element on grounds that it is consumed. In fact, the Examiner has not even cited dictum that states that a claimed structural element that is consumed cannot be part of a claimed structure.

A fifth reason as to why the Examiner's argument is not persuasive is that all matter is being consumed by virtue of the second law of thermodynamics (i.e., the law of increasing entropy). Thus, the Examiner's argument, if accepted, would invalidate every structural element claimed in every issued patent, since all structural elements are being consumed on some time scale. Indeed, the sun and the earth will cease to exist at some time in the future. As a less extreme example, any claimed exposed copper as part of an electrical structure or apparatus will be consumed by oxidation over a period of time that is not very long. Are all claims in existing patents that claim exposed copper as part of an electrical structure invalid? What about a photoresist layer in an electrical structure, wherein a portion of the photoresist layer that is subsequently exposed to ultraviolet radiation will be etched away by an etchant following said exposure? Are all claims in existing patents that claim a consumable photoresist layer as part of a claimed structure unpatentable under 35 U.S.C. §112, second paragraph?

A sixth reason as to why the Examiner's argument is not persuasive is that claims 26, 31, and 41 are drawn to a structure having an acid solution that has the property of being able to destroy or transform an object that the acid solution acts upon, wherein the acid solution may be consumed. Indeed, the United States Patent and Trademark Office (USPTO) regularly allows claims that claim a structure having a structural element that is able to destroy or transform an object that the structural element acts upon, wherein the structural element is or may be consumed. Appellants disclose the following five patents as illustrative examples.

United States Patent 6,228,246 to Datta et al. (issued May 8, 2001) recites claim 38:

38. An electrochemical structure, comprising:

an acid solution;

a pulse power supply generating a periodic voltage, wherein a period of the periodic voltage includes a pulse voltage for a first time interval followed by a zero voltage for a second time interval;

a conductive cathode immersed in the acid solution, wherein the conductive cathode is electrically coupled to a negative terminal of the pulse power supply; and

a dielectric substrate immersed in the acid solution, wherein the substrate includes:

a metal structure selected from the group consisting of a copper-Invar laminate, a nickel-iron alloy layer, and a laminate of a copper layer and a nickel-iron alloy layer, wherein the metal structure is electrically coupled to a positive terminal of the pulse power supply;

a through hole passing through the metal structure; and

a metal skin on a through-hole surface of the metal structure.

In claim 38, the acid solution of the Datta patent dissolves the metal skin (see the Datta abstract). Similarly, the acid solution of claims 26, 31, and 41 of the present invention dissolves the chromium volume. In addition, if the acid solution of the Datta patent is being consumed then the acid solution of claims 26, 31, and 41 of the present invention is being similarly consumed. Thus, Appellants contend that if United States Patent 6,228,246 to Datta is not unpatentable under 35 U.S.C. §112, second paragraph even though the acid solution is

consumable and is part of the claimed electrochemical structure, then claims 26, 31, and 41 of the present invention are similarly not unpatentable under 35 U.S.C. §112, second paragraph even though the acid solution is consumable and is part of the claimed electrical structure.

United States Patent 6,458,489 to Alzieu et al. (issued Oct. 1, 2002) recites claim 1:

1. Lead-acid battery comprising:

a positive electrode (1) containing lead oxide as active material,

a negative electrode (3) containing lead sponge as active material,

an electrolyte (9) formed of a solution of sulphuric acid,

a separator element (5, 7) between the positive electrode and the negative electrode, and

means for applying a stress to the assembly perpendicular to the plane of the electrodes,

in which, in the charged state, the quantity of sulphuric acid in the positive electrode represents at least 0.20 mole of H_2SO_4 per mole of active material in the positive electrode, and/or the quantity of sulphuric acid in the negative electrode represents at least 0.20 mole of H_2SO_4 per mole of active material in the negative electrode, and in which the stress applied to the electrodes is 0.01 to 0.3 Mpa.

In claim 1, the claimed battery of the Alzieu patent claims the electrolyte (sulfuric acid) which is of course consumed since the chemical reaction that consumes the electrolyte is what makes a battery work. According to the Examiner's analysis, claim 1 of the Alzieu patent should be unpatentable under 35 U.S.C. §112, second paragraph because the claimed battery comprises an electrolyte (sulfuric acid) which is consumed. Yet, not only is claim 1 of the Alzieu patent presumed by law to be patentable, but there exist many issued patents drawn to a battery that

comprises an electrolyte. In addition, the electrolyte (sulfuric acid) dissolves an electrode of the battery which is also how the battery works. Similarly, the acid solution of claims 26, 31, and 41 of the present invention dissolves the chromium volume. Thus, Appellants contend that if United States Patent 6,458,489 to Alzieu is not unpatentable under 35 U.S.C. §112, second paragraph even though the electrolyte is consumable and is part of the claimed battery, then claims 26, 31, and 41 of the present invention are similarly not unpatentable under 35 U.S.C. §112, second paragraph even though the acid solution is consumable and is part of the claimed electrical structure.

United States Patent 6,509,546 to Egitto et al. (issued Jan. 21, 2003) recites claim 18:

18. A laser structure, comprising:

a panel having a two dimensional array of cells, wherein a first kerf between a first pair of adjacent cells has a first width between about 2 microns and about 75 microns, wherein a second kerf between a second pair of adjacent cells has a second width between about 2 microns and about 75 microns, wherein the first and second kerfs have directional orientations that are about perpendicular to each other, and wherein the panel comprises a layered structure that includes a dielectric layer and a metal layer; and

a laser beam focused within the first kerf, wherein the laser beam has a wavelength between about 500 nanometers and about 600 nanometers.

In claim 18 of the Egitto patent, the laser beam is used to form a panel with excised cells, wherein the laser beam performs the excising. Similarly, the acid solution of claims 26, 31, and 41 of the present invention dissolves the chromium volume and thus may be said to

“excise” the chromium volume. In any event, both the laser beam of the Egitto patent and the acid solution of claims 26, 31, and 41 of the present invention destructively interact with matter to be removed. In addition, the acid solution of claims 26, 31, and 41 of the present invention is being consumed to no less of an extent than is the laser beam of the Egitto. Thus, Appellants contend that if United States Patent 6,509,546 to Egitto is not unpatentable under 35 U.S.C. §112, second paragraph even though the laser beam is consumable and is part of the claimed laser structure, then claims 26, 31, and 41 of the present invention are similarly not unpatentable under 35 U.S.C. §112, second paragraph even though the acid solution is consumable and is part of the claimed electrical structure.

United States Patent 6,730,984 to Ballantine et al. (issued May 4, 2004) recites claim 4 59.

4. An electrical structure, comprising a semiconductor structure that includes a resistor,
 - wherein the resistor includes a surface layer and a subsurface layer,
 - wherein the subsurface layer is in direct mechanical contact with the surface layer,
 - wherein an exterior surface of the resistor includes an exterior surface of the surface layer,
 - wherein the exterior surface of the resistor does not include any exterior surface of the subsurface layer,
 - wherein the subsurface layer includes an unoxidized material,
 - wherein the surface layer comprises an oxidized portion that includes an oxidized material,
 - wherein the exterior surface of the surface layer includes an exterior surface of the

oxidized portion,

wherein the oxidized portion is a fraction F of the surface layer such that F has a value equal to a ratio of the surface area of the exterior surface of the oxidized portion to the surface area of the exterior surface of the surface layer,

wherein oxygen-comprising molecules distinct from the oxidized material are present at the exterior surface of the oxidized portion,

wherein an electrical resistance of the resistor having the oxidized material exceeds an electrical resistance that the resistor would have if the oxidized material were replaced by an equivalent volume of the unoxidized material,

wherein the oxidized portion is at a heating temperature that is at least as high as a minimum temperature at which the unoxidized material could chemically react with the oxygen-comprising molecules to generate the oxidized material if the oxygen-comprising molecules were in contact with the unoxidized material,

wherein a beam is present at the exterior surface of the oxidized portion and directed toward the oxidized portion,

wherein the beam is selected from the group consisting a beam of radiation and a beam of particles, and

wherein the heating temperature would be below said minimum temperature if the beam were not present at the exterior surface of the oxidized portion.

Claim 4 of the Ballantine patent comprises two structural features which are consumable, namely oxygen-comprising molecules which chemically react with unoxidized material in the resistor (“wherein the oxidized portion is at a heating temperature that is at least

as high as a minimum temperature at which the unoxidized material could chemically react with the oxygen-comprising molecules to generate the oxidized material if the oxygen-comprising molecules were in contact with the unoxidized material”) and a beam of radiation or particles directed toward the oxidized portion of the resistor for the purpose of heating the oxidized portion (“wherein the heating temperature would be below said minimum temperature if the beam were not present at the exterior surface of the oxidized portion”). According to the Examiner’s analysis, claim 4 of the Ballantine patent should be unpatentable under 35 U.S.C. §112, second paragraph because the claimed electrical structure comprises oxygen-comprising molecules and a beam of radiation or particles, both of which are consumed. Yet, claim 4 of the Ballantine patent is presumed by law to be patentable. Analogous to the oxygen-comprising molecules and beam of radiation or particles of the Ballantine patent which respectively oxidizes and heats the resistor, the acid solution of claims 26, 31, and 41 of the present invention dissolves the chromium volume. Thus, Appellants contend that if United States Patent 6,730,984 to Ballantine is not unpatentable under 35 U.S.C. §112, second paragraph even though the oxygen-comprising molecules and a beam of radiation or particles is consumable and is part of the claimed electrical structure, then claims 26, 31, and 41 of the present invention are similarly not unpatentable under 35 U.S.C. §112, second paragraph even though the acid solution is consumable and is part of the claimed electrical structure.

United States Patent 6,472,123 to DeLaRosa (issued Oct. 29, 2002) recites claim 12:

12. An structure for use in forming a photolithography device, said intermediate structure comprising:

a transparent substrate;

a light blocking material layer provided over said substrate; and

a **photoresist layer** provided over said substrate and including first and second portions which have been patterned through multiple write passes of electron beam energy over said substrate and wherein an entire thickness of said first and second portions is exposed.

In claim 12 of the DeLaRosa patent, the photoresist layer is part of the intermediate structure and is consumed. See col. 4, lines 30-38 (“The sequential write passes leave unexposed some portions of the photoresist material 14, namely the three strips 50, 52, 72 in the illustrated embodiment. The second write pass exposes a larger portion of photoresist material 14 than the first write pass. The **exposed portions**, as well as the underlying metal areas, **are etched away**, and then the **unexposed strips 50, 52, 72 are removed**, leaving metal strips 162, 164, 166 on the substrate 12 to form the reticle 200”). According to the Examiner’s analysis, claim 12 of the DeLaRosa patent should be unpatentable under 35 U.S.C. §112, second paragraph because the claimed electrical structure comprises a photoresist layer which is consumed. Yet, claim 12 of the DeLaRosa patent is presumed by law to be patentable even though the photoresist layer is consumed and is part of the claimed intermediate structure.

The preceding five issued patents are merely representative and there are hundreds of issued patents which claim structure comprising a consumable structural element that is analogous to the acid solution of claims 26, 31, and 41 of the present invention. Therefore, the Examiner’s basis for rejection of claims 26, 31, and 41 under 35 U.S.C. §112, second paragraph (i.e., “The acid is not part of the structure. The acid reacts with the metal and is consumed.”)

appears to be contrary to established policy of the United States Patent and Trademark Office (USPTO) which regularly issues patents having claims analogous to 26, 31, and 41 of the present invention with respect to the preceding issues under 35 U.S.C. §112, second paragraph. Moreover, it is inequitable and intrinsically unfair for the USPTO to discriminate against Appellants by rejecting claims 26, 31, and 41 of the present invention under 35 U.S.C. §112, second paragraph and yet issue patents having similar or analogous claims as Appellants' claims.

Based on the preceding arguments, Appellants respectfully request reversal of the preceding rejection of claims 26, 31, and 41 under 35 U.S.C. §112, second paragraph.

Issue 2

CLAIM 41 IS NOT UNPATENTABLE UNDER 35 U.S.C. §112, SECOND PARAGRAPH, AS ALLEGEDLY “being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.”

The Examiner rejected claim 41 under 35 U.S.C. §112, second paragraph, as allegedly “being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: If the acid were to be accepted to be a structure, which it is not, the claims would be rejected as failing to disclose how the acid interacts with the structural components of the claim(s).”

In response to the preceding rejection of claim 41 under 35 U.S.C. §112, second paragraph, Appellants respectfully contends that a relevant structural relationship between the acid solution and other elements of claim 41, namely the chromium volume and the iron-

comprising body, is: “an acid solution in contact with both the chromium volume and the iron-comprising body”. Based on the preceding argument, Appellants respectfully request reversal of the preceding rejection of claim 41 under 35 U.S.C. §112, second paragraph.

Issue 3

CLAIMS 26, 27, 19-22, 28, 29, 31-36, AND 38-42 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(A) OVER WEI (UNITED STATES PATENT NO. 4,350,564) AND GESHNER (UNITED STATES PATENT NO. 4,105,468).

The Examiner rejected claims 26, 27, 19-22, 28, 29, 31-36, and 38-42 as allegedly being unpatentable under 35 U.S.C. §103(a) over Wei (United States Patent No. 4,350,564) and Geshner (United States Patent No. 4,105,468).

Claims 26, 31, and 41

As to independent claims 26, 31, and 41, the Examiner argues: "With specific respect to claims disclosing an electrical structure comprising: a chromium volume, and a layer of conductive material, wherein the chromium volume includes a layer of chromium, wherein the layer of conductive metal is on the layer of chromium, wherein the conductive metal includes an opening extending through its thickness. Wherein the opening exposes the layer of chromium. The same is identically disclosed in figure 4E of Wei and associated relevant text. It is noted that it is unclear whether the iron comprising body is part of the structure or is drawn to a future intended use. The specification suggests that the iron containing body is a probe (see element 22 of the instant invention) if the iron is a mere probe than it is not properly part of the structure. Exactly what weight should be accorded the probe is unclear. However, in the interests of being rigorous, Geshner discloses a probe and explicitly provides the motivation for making the instant combination. Specifically, Geshner discloses: "the probe is brought into contact with the undesired areas 16, it has been found that a reaction will be initiated which will cause only the undesired areas 16 to be completely etched away." The artisan would have made to combination for improved etch selectivity."

In response to the preceding remarks by the Examiner, Appellants respectfully contend that from the language of claims 26, 31, and 41, it is clear and unambiguous that the iron-comprising body in claims 26, 31, and 41 is being claimed as part of the electrical structure. Moreover, the specification of the present patent application clearly describes the iron-comprising body 22 as being comprised by an electrical structure.

Appellants contend that claims 26, 31, and 41 are not unpatentable over Wei and Geshner, because Wei and Geshner does not teach or suggest each and every feature of claims 26, 31, and 41. For example, Wei and Geshner does not teach or suggest the feature: “an iron-comprising body ... wherein a portion of the iron-comprising body is within the opening, wherein the portion of the iron-comprising body is in electrical contact with the chromium volume” (claim 26); and Wei and Geshner does not teach or suggest the feature “an iron-comprising body in electrical contact with the chromium volume” (claims 31 and 41). In particular, Appellants respectfully content that the Examiner’s argument for modifying Wei by adding the metal probe disclosed by Geshner is not persuasive, because Wei does not require or need improved etch selectivity. Nowhere does Wei disclose any problem whatsoever with etch selectivity, or any need for improved etch selectivity, in etching the chromium film 18 shown in the transition from FIG. 3C to FIG. 3D of Wei. Wei etches the chromium film 18 with hydrochloric acid (see Wei, col. 3, lines 7-15) and uses a “layer of material 19 which is resistant to the etching of hydrochloric acid....” (see Wei, col. 2, lines 59-64). In addition, a silicon dioxide layer 16 underlies the chromium film 18 (see Wei, col. 2, lines 52-59) and silicon dioxide is etch resistant. In fact, Wei contemplates the use of silicon dioxide as an embodiment for the etch resistant layer 19 (see Wei, col. 5, lines 14-17). Thus, Wei has no need for etch

selectivity improvement, and incorporating Geshner's metal probe into Wei would add unnecessary complexity and expense.

In addition, Wei and Geshner does not teach or suggest the feature: "wherein the portion of the acid solution is in contact with both the portion of the iron-comprising body and the chromium volume" (claim 26); and Wei does not teach or suggest the feature: "an acid solution in contact with both the chromium volume and the iron-comprising body" (claims 31 and 41). Indeed, the Examiner's argument in rejecting independent claims 26, 31, and 41 is **totally silent** as to the existence of the acid solution, and the Examiner has offered no argument as to how and why Wei in view of Geshner teaches or suggests the aforementioned feature relating to the acid solution. In summary, the Examiner has not satisfied the Examiner's burden to prove a *prima facie* case of obviousness with respect to the acid solution related features of claims 26, 31, and 41, because the Examiner has totally ignored the acid solution and has made no argument as to how Wei in view of Geshner teaches or suggests the aforementioned feature relating to the acid solution.

As a further note, the Examiner's arguments as to why the acid solution is allegedly not part of the electrical structure of claims 26, 31, and 41 under 35 U.S.C. §112, second paragraph does not eliminate the need for the Examiner to independently support the rejection under 35 U.S.C. §103(a). Even if it should be held that the acid solution is not part of the electrical structure of claims 26, 31, and 41, the acid solution nonetheless places limitations on claims 26, 31, and 41 and the Examiner must present an argument showing that such limitations are obvious in light of the prior art, in order to sustain the rejection under 35 U.S.C. §103(a).

Based on the preceding arguments, Appellants respectfully maintain that claims 26, 31,

and 41 are not unpatentable over Wei and Geshner, and that claims 26, 31, and 41 are in condition for allowance. Since claims 19-22, 27-29 and 39 depend from claim 26, Appellants contend that claims 19-22, 27-29 and 39 are likewise in condition for allowance. Since claims 32-36, 38 and 40 depend from claim 31, Appellants contend that claims 32-36, 38 and 40 are likewise in condition for allowance. Since claim 42 depends from claim 41, Appellants contend that claim 42 is likewise in condition for allowance.

Claims 19 and 32

Since claims 19 and 32 respectively depend from claims 26 and 31, which Appellants have argued *supra* as not being unpatentable under 35 U.S.C. §103(a), Appellants contend that claims 19 and 32 are likewise not unpatentable under 35 U.S.C. §103(a).

In addition, Appellants contend that Wei and Geshner does not teach or suggest the following particular feature of claims 19 and 32: “wherein the electrical structure further comprises a chromium oxide layer on the chromium volume”. The Examiner argues: “Claims reciting that there is a chromium oxide layer on the chromium layer. Initially, it is noted that the chromium layer would inherently form an oxide layer upon exposure to the air. Nonetheless, Geshner discloses that chromium and chromium oxide are interchangeable. ”

In response to the preceding inherency argument by the Examiner, Appellants contend that in FIG. 4C of Wei, there is no disclosure in Wei that the chromium layer 18 in Wei is exposed to the air for a long enough time to be oxidized to form a chromium oxide layer on the chromium volume.

In response to the preceding argument by the Examiner that “ Geshner discloses that

chromium and chromium oxide are interchangeable”, Appellants note that the Examiner has provided an argument as to why it is obvious to combine Geshner with Wei with respect to the aforementioned particular feature of claims 19 and 32. Accordingly, Appellants maintain that the Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claims 19 and 32.

Claims 22 and 28

Since claims 22 and 28 depend from claim 26, which Appellants has argued *supra* as not being unpatentable under 35 U.S.C. §103(a), Appellants contend that claims 22 and 28 are likewise not unpatentable under 35 U.S.C. §103(a).

In addition, Appellants contend that Wei and Geshner does not teach or suggest the following particular feature of claims 22 and 28: “wherein said iron-comprising body includes steel”.. The Examiner argues: “As to the limitation that the iron-comprising body includes steel, it would have been obvious to etch the chromium volume by contacting the chromium volume with an iron comprising body that is steel because Geshner teaches an iron-comprising body and one of ordinary skill in the art would have arrived at the same expected results. Steel is predominately iron and iron is therefore subsumed with the definition of steel. ”

Appellants contend that the Examiner’s argument that “[s]teel is predominately iron and iron is therefore subsumed with the definition of steel” would have credibility if iron were being claimed and the reference disclosed steel but not iron, since steel comprises iron by definition. However, the preceding argument by the Examiner has no credibility for claims 22 and 28 in which steel is being claimed and the reference disclosed iron but not steel, since iron

does not comprise steel by definition. Accordingly, Appellants maintain that the Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claims 22 and 28.

Claims 27, 33, and 35

Since claims 27, 33, and 35 respectively depend from claims 26, 31, and 31, which Appellants have argued *supra* as not being unpatentable under 35 U.S.C. §103(a), Appellants contend that claims 27, 33, and 35 are likewise not unpatentable under 35 U.S.C. §103(a).

Claims 20-21, 29, 34, 36, 38-40, and 42

Since claims 20-21 and 29 depend from claim 26, which Appellants has argued *supra* as not being unpatentable under 35 U.S.C. §103(a), Appellants contend that claims 20-21 and 29 are likewise not unpatentable under 35 U.S.C. §103(a). Since claims 34, 36, and 38-40 depend from claim 31, which Appellants has argued *supra* as not being unpatentable under 35 U.S.C. §103(a), Appellants contend that claims 34, 36, and 38-40 are likewise not unpatentable under 35 U.S.C. §103(a). Since claim 42 depends from claim 41, which Appellants has argued *supra* as not being unpatentable under 35 U.S.C. §103(a), Appellants contend that claim 42 is likewise not unpatentable under 35 U.S.C. §103(a).

In addition, Appellants contend that the Examiner has not established a *prima facie* case of obviousness with respect to claims 20-21, 29, 34, 36, 38-40, and 42, in light of the following argument by the Examiner: “As to claims that recite acid, concentration, etch rates and

temperatures, as discussed above, the acid, regardless of the form, is not considered to be part of the structure, however it is disclosed in both Wei (*inter alia* abstract) and Geshner (*inter alia* Table I).”

In response that the Examiner’s argument that “ the acid, regardless of the form, is not considered to be part of the structure”, Appellants contend that the Examiner’s arguments as to why the acid solution is allegedly not part of the electrical structure of claims 26, 31, and 41 under 35 U.S.C. §112, second paragraph does not eliminate the need for the Examiner to independently support the rejection under 35 U.S.C. §103(a). Even if it should be held that the acid solution is not part of the electrical structure of claims 20-21, 29, 34, 36, 38-40, and 42, the acid solution nonetheless places limitations on claims 20-21, 29, 34, 36, 38-40, and 42 and the Examiner must present an argument that such limitations are obvious in light of the prior art, in order to sustain the rejection under 35 U.S.C. §103(a).

Next, Appellants consider the Examiner’s argument that the features of claims 20-21, 29, 34, 36, 38-40, and 42 are disclosed in the abstract of Wei and Table I of Geshner.

With respect to claim 20, Appellants contend that the abstract of Wei and Table I of Geshner does not disclose the following particular feature of claim 20: “wherein the acid solution includes hydrochloric acid in a liquid bath form”. Accordingly, Appellants maintain that the Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claim 20.

With respect to claim 21, Appellants contend that the abstract of Wei and Table I of Geshner does not disclose the following particular feature of claim 21: “wherein the acid solution includes hydrochloric acid in a spray form”. Accordingly, Appellants maintain that the

Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claim 21.

With respect to claims 29 and 36, Appellants contend that the abstract of Wei and Table I of Geshner does not disclose the following particular feature of claims 29 and 36: “wherein the acid solution includes hydrochloric acid, and wherein a temperature (T) and a molarity (M) of the hydrochloric acid is within a triangular space defined by (T,M) points of (21 °C, 2.4 M), (52 °C, 2.4 M), and (52 °C, 1.2 M)”. Accordingly, Appellants maintain that the Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claim 29 and 36.

With respect to claims 34 and 42, Appellants contend that the abstract of Wei and Table I of Geshner does not disclose the following particular feature of claims 34 and 42: “wherein the acid solution is not in contact with the layer of conductive metal”. Accordingly, Appellants maintain that the Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claim 34 and 42.

With respect to claims 38 and 40, Appellants contend that the abstract of Wei and Table I of Geshner does not disclose the following particular feature of claims 38 and 40: “wherein the acid solution is adapted to etch the chromium volume at a second etch rate that exceeds the first etch rate”. Accordingly, Appellants maintain that the Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claims 38 and 40.

With respect to claim 39, Appellants contend that the abstract of Wei and Table I of Geshner does not disclose the following particular feature of claim 39: “wherein the acid

solution is adapted to etch metallic chromium at a first etch rate in an absence of any present or prior contact between the metallic chromium and a body that includes iron.” Accordingly, Appellants maintain that the Examiner has not established a *prima facie* case of obviousness with respect to the aforementioned particular feature of claim 39.

Issue 4

CLAIMS 30 AND 37 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(A) OVER WEI (UNITED STATES PATENT NO. 4,350,564) AND GESHNER (UNITED STATES PATENT NO. 4,105,468) AND BONDER (UNITED STATES PATENT NO. 5,149,404).

The Examiner rejected claims 30 and 37 as allegedly being unpatentable under 35 U.S.C. §103(a) over Wei (United States Patent No. 4,350,564) and Geshner (United States Patent No. 4,105,468) and Bonder (United States Patent No. 5,149,404).

The Examiner rejected claims 30 and 37 under 35 U.S.C. §103(a) as allegedly being unpatentable over Wei and Geshner and Bonder. Since claims 30 and 37 respectfully depend from claims 26 and 31, which Appellants have argued *supra* to be patentable under 35 U.S.C. §103(a), Appellants maintain that claims 30 and 37 are not unpatentable under 35 U.S.C. §103(a).

In addition, Appellants contend that Wei and Geshner and Bonder does not teach or suggest the following particular feature of claims 30 and 37: “a fluoropolymer dielectric volume **bonded** to said chromium volume” (emphasis added).

The Examiner admits: “The combination of Wei and Geshner does not explicitly disclose a fluoropolymer dielectric volume bonded to the chromium volume.”

The Examiner argues: “However, Bonder discloses wherein a photoresist volume is bonded to the chromium volume (column 1, lines 20-38).... It would have been obvious to one of ordinary skill in the art at the time the invention was made to bond a fluoropolymer dielectric volume to the chromium volume because fluoropolymer dielectric materials are conventionally used as photoresist masks in the etching of metallic films and the integrated electrical circuit

fabrication industry and Blonder teaches that reticle masks made of chromium are ordinarily patterned by a radiation photoresist (column 1, lines 20-38). The use of materials to perform their known function in a conventional process is obvious”.

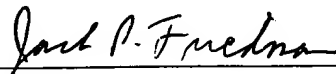
Appellants contend that neither Wei nor Blonder discloses a fluoropolymer dielectric volume **bonded** to said chromium volume, as required by claims 30 and 37. Wei discloses only that the resist layer 19 is **deposited** on the chromium layer 18 (see Wei, col. 2, lines 59-62. Blonder discloses only that the resist layer is **coated** over a conducting silicon surface (see Blonder, col. 9, lines 31-33. Indeed, it would be a disadvantage to Wei’s invention to bond the resist layer 19 to the chromium layer 18 rather than to deposit the resist layer 19 on the chromium layer 18, since the resist layer 19 is removed in 4E of Wei.

Based on the preceding arguments, Appellants respectfully maintain that claims 30 and 37 are not unpatentable over Wei and Geshner and Blonder, and that claims 30 and 37 are in condition for allowance.

SUMMARY

In summary, Appellant respectfully requests reversal of the December 30, 2003 Office Action rejection of claims 19-22 and 26-42.

Respectfully submitted,



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Dated: 06/02/2004

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Appl. No.: 09/514,526

Applicant(s): Farquhar *et al.*

Filed: 02/28/00

Art Unit: 1746

Dkt. No.: **END000006US1**

Examiner: G. Winter

Title: **Accelerated Etching of Chromium**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPENDIX - CLAIMS ON APPEAL

19. The electrical structure of claim 26, wherein the electrical structure further comprises a chromium oxide layer on the chromium volume.

20. The electrical structure of claim 26, wherein the acid solution includes hydrochloric acid in a liquid bath form.

21. The electrical structure of claim 26, wherein the acid solution includes hydrochloric acid in a spray form.

22. The electrical structure of claim 26, wherein said iron-comprising body includes steel.

26. An electrical structure, comprising:

a chromium volume, wherein the chromium volume includes a layer of chromium;

an iron-comprising body;

an acid solution; and

a layer of conductive metal on the layer of chromium, wherein the conductive metal includes an opening extending through its thickness, wherein a portion of the iron-comprising body is within the opening, wherein the portion of the iron-comprising body is in electrical contact with the chromium volume, and wherein a portion of the acid solution is within the opening, and wherein the portion of the acid solution is in contact with both the portion of the iron-comprising body and the chromium volume.

27. The electrical structure of claim 26, wherein the layer of conductive metal includes a metal selected from the group consisting of copper, aluminum, nickel, silver, and gold.

28. The electrical structure of claim 26, wherein the iron-comprising body includes steel, and wherein the chromium volume includes the metallic chromium.

29. The electrical structure of claim 26, wherein the chromium volume includes the metallic chromium, wherein the acid solution includes hydrochloric acid, and wherein a temperature (T) and a molarity (M) of the hydrochloric acid is within a triangular space defined by (T,M) points of (21 °C, 2.4 M), (52 °C, 2.4 M), and (52 °C, 1.2 M).

30. The electrical structure of claim 26, further comprising a fluoropolymer dielectric volume bonded to said chromium volume.

31. An electrical structure, comprising:

a chromium volume;

an iron-comprising body in electrical contact with the chromium volume;

an acid solution in contact with both the chromium volume and the iron-comprising body, wherein the acid solution is adapted to etch metallic chromium at a first etch rate in an absence of any present or prior contact between the metallic chromium and a body that includes iron.

32. The electrical structure of claim 31, wherein the electrical structure further comprises a chromium oxide layer on the chromium volume.

33. The electrical structure of claim 31, further comprising a layer of conductive metal, wherein the chromium volume includes a layer of chromium, and wherein the layer of chromium is on the layer of conductive metal.

34. The electrical structure of claim 33, wherein the acid solution is not in contact with the layer of conductive metal.

35. The electrical structure of claim 34, wherein the layer of conductive metal includes a metal selected from the group consisting of copper, aluminum, nickel, silver, and gold.

36. The electrical structure of claim 31, wherein the chromium volume includes the metallic chromium, wherein the acid solution includes hydrochloric acid, wherein a temperature (T) and a molarity (M) of the hydrochloric acid is within a triangular space defined by (T,M) points of (21 °C, 2.4 M), (52 °C, 2.4 M), and (52 °C, 1.2 M).

37. The electrical structure of claim 31, further comprising a fluoropolymer dielectric volume bonded to said chromium volume.

38. The electrical structure of claim 31, wherein the acid solution is adapted to etch the chromium volume at a second etch rate that exceeds the first etch rate.

39. The electrical structure of claim 26, wherein the acid solution is adapted to etch metallic chromium at a first etch rate in an absence of any present or prior contact between the metallic chromium and a body that includes iron.

40. The electrical structure of claim 39, wherein the acid solution is adapted to etch the chromium volume at a second etch rate that exceeds the first etch rate.

41. An electrical structure, comprising:

a chromium volume;

an iron-comprising body in electrical contact with the chromium volume;

an acid solution in contact with both the chromium volume and the iron-comprising body; and

a layer of conductive metal, wherein the chromium volume includes a layer of chromium, and wherein the layer of chromium is on the layer of conductive metal and in direct mechanical contact with the layer of conductive metal.

42. The electrical structure of claim 41, wherein the acid solution is not in contact with the layer of conductive metal.